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Notice of Allowability

Application No.

10/757,204

Examiner

Sang Nguyen

Applicant(s)

KE ET AL.

Art Unit

2886

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to interview on 3/23/07 & amendment on 02/14/07.
2. ☒ The allowed claim(s) is/are 1-2, 5-7, 10-18, 21-23, and 27-28 which have been renumbered as indicate 1-19.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>3/23/07</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Mark J. Marcelli (Reg. No. 36,593) on March 23, 2007.

The application has been amended as follows by the amendment on 02/14/2007:

Claims 8-9, 19-20, and 25-26 have been canceled.

Claim 10 line 1; delete "9" and replaced by – 1 --.

Claim 21 line 1; delete "20" and replaced by – 12 --.

Claim 27 line 1; delete "26" and replaced by – 23 --.

1. (Currently Amended) A method for obtaining values for optical constants n and k for a layer on a substrate comprising:

- (a) providing a substrate with an organic or inorganic layer formed thereon;
- (b) performing a spectral ellipsometer measurement and a broadband spectrometer measurement of said organic or inorganic layer in an integrated optical measurement system;
- (c) independent of said performing, determining a thickness for said organic or inorganic layer using an independent optical thickness measurement component based on Beam Profile Reflectometry or Beam Profile Ellipsometry; and

(d) determining said values for said optical constants n and k for said organic or inorganic layer based on said thickness, the spectral ellipsometer measurement, the broadband spectrometer measurement, and modeling information, wherein n represents index of refraction and k represents extraction coefficient; and

(e) displaying an experimental data output for said thickness data of organic or inorganic layer combined with measurement data from said spectral ellipsometer and broadband spectrometer measurements, wherein said experimental data output is fitted to modeling data to provide a best fit of experimental data to modeling data.

12. (Twice Amended) A method for obtaining n and k values for corresponding optical constants n and k for a top layer in a bilayer film stack on a substrate comprising:

(a) providing a substrate having a stack of layers comprised of a top photoresist layer and a bottom layer formed thereon;

(b) performing a spectral ellipsometer measurement and a broadband spectrometer measurement of said top photoresist layer in an integrated optical measurement system;

(c) inputting an input thickness value and input n and k values for said bottom layer into a program used to calculate said n and k values;

(d) independent of said performing, determining a thickness for said top photoresist layer using an independent optical thickness measurement component based on Beam Profile Reflectometry or Beam Profile Ellipsometry; and

(e) independent of said performing, determining said values n and k values for

Art Unit: 2886

said top photoresist layer based on data that includes the thickness of said top photoresist layer, the spectral ellipsometer measurement, the broadband spectrometer measurement, and modeling information, wherein n represents index of refraction and k represents extraction coefficient; and

(e) displaying an experimental data output for said the thickness of the top photoresist layer combined with measurement data from said spectral ellipsometer and broadband spectrometer measurements, wherein said experimental data output is fitted to modeling data to provide a best fit of experimental data to modeling data.

23. (Twice Amended) A method for obtaining n and k values for corresponding optical constants n and k for a top layer in a trilayer film stack on a substrate comprising:

(a) providing a substrate having a stack of layers comprised of a bottom inorganic layer, a middle organic anti-reflective coating layer, and a top photoresist layer formed thereon;

(b) performing a spectral ellipsometer measurement and a broadband spectrometer measurement of said top photoresist layer in an integrated optical measurement system;

(c) inputting a thickness and input n and k values for said bottom inorganic layer and said middle anti-reflective coating layer into a program used to calculate said n and k values;

(d) independent of said performing, determining a thickness for said top photoresist layer using an independent optical thickness measurement component

Art Unit: 2886

based on Beam Profile Reflectometry or Beam Profile Ellipsometry; and

(e) determining said n and k values for said top photoresist layer based on data that includes the thickness of said top photoresist layer, the spectral ellipsometer measurement, the broadband spectrometer measurement, and modeling information, wherein n represents index of refraction and k represents extraction coefficient; and

(e) displaying an experimental data output for said the thickness of the top photoresist layer combined with measurement data from said spectral ellipsometer and broadband spectrometer measurements, wherein said experimental data output is fitted to modeling data to provide a best fit of experimental data to modeling data.

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance:

As to method and device claim 1 is allowable over the prior art for at least the reason that the prior art of record, taken alone or in combination, fails discloses or render obvious a method for obtaining values for optical constants n and k for a layer comprising all the specific elements with the specific combination including of step of (c) independent of said performing, determining a thickness for said organic or inorganic layer using an independent optical thickness measurement component based on Beam Profile Reflectometry or Beam Profile Ellipsometry and (d) determining said values for said optical constants n and k for said organic or inorganic layer based on said thickness, the spectral ellipsometer measurement, the broadband spectrometer measurement, and modeling information, wherein n represents index of refraction and k represents extraction coefficient in combination with the rest of the limitation of claim 1.

Art Unit: 2886

The dependent claims 2, 5-7, and 10-11 are allowed by virtue of their dependence on claim 1.

As to method and device claim 12 is allowable over the prior art for at least the reason that the prior art of record, taken alone or in combination, fails discloses or render obvious a method for obtaining n and k values for corresponding optical constants n and k for a top layer in a layer film stack on the a substrate comprising all the specific elements with the specific combination including of step of (c) inputting an input thickness value and input n and k values for said bottom layer into a program used to calculate said n and k values, (d) independent of said performing, determining a thickness for said top photoresist layer using an independent optical thickness measurement component based on Beam Profile Reflectometry or Beam Profile Ellipsometry, and (e) independent of said performing, determining said values n and k values for said top photoresist layer based on data that includes the thickness of said top photoresist layer, the spectral ellipsometer measurement, the broadband spectrometer measurement, and modeling information, wherein n represents index of refraction and k represents extraction coefficient in combination with the rest of the limitation of claim 12. The dependent claims 13-18 and 21-22 are allowed by virtue of their dependence on claim 12.

As to method and device claim 23 is allowable over the prior art for at least the reason that the prior art of record, taken alone or in combination, fails discloses or render obvious a method for obtaining n and k values for corresponding optical constants n and k for a top layer in a trilayer film stack on the a substrate comprising all

Art Unit: 2886

the specific elements with the specific combination including of step of (c) inputting a thickness value and input n and k values for said bottom inorganic layer and said middle anti-reflective coating layer into a program used to calculate said n and k values, (d) independent of said performing, determining a thickness for said top photoresist layer using an independent optical thickness measurement component based on Beam Profile Reflectometry or Beam Profile Ellipsometry, and (e) independent of said performing, determining said values n and k values for said top photoresist layer based on data that includes the thickness of said top photoresist layer, the spectral ellipsometer measurement, the broadband spectrometer measurement, and modeling information, wherein n represents index of refraction and k represents extraction coefficient in combination with the rest of the limitation of claim 23. The dependent claims 27-28 are allowed by virtue of their dependence on claim 23.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sang Nguyen whose telephone number is (571) 272-2425. The examiner can normally be reached on 9:30 am to 7:00 pm.

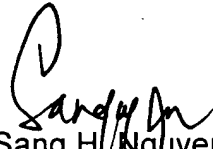
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifu Chowdhury can be reached on (571) 272-2800 ext. 86. The fax

Art Unit: 2886

phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

March 23, 2007


Sang H. Nguyen
Primary Patent Examiner
Art Unit 2886